Long-lasting inhibitory effects on repeated recognition tests

Tsukuba Psychological Research
1996, **18**, 71-74

Long-lasting inhibitory effects on repeated recognition tests

Takafumi Terasawa[1] *(Institute of Psychology, University of Tsukuba)*
Tetsuya Yoshida *(College of Human Sciences, University of Tsukuba)*
Teruhiko Ichida *(Shizuoka Prefectual Office)*
Fukiko Mizutani *(Kumon Institute of Education)*

We have reported long-lasting effects of a much earlier experience on recognition judgment (e.g., Terasawa & Ohta, 1993). In these studies subjects joined two sessions with an interval of more than 3 months; it was shown that a single encounter with stimuli in the first session affects recognition performance to the stimuli in the second session. The present study examines the effect of a recognition test in the first session on a similar recognition test in the second session when the words used in the first session were never presented in the second session. Subjects participated in two sessions with a 12-week interval. Two lists of Japanese words were randomly selected and the targets and distracters in each session were randomly selected from one of the lists. The main result was that the first session lowered recognition performance in the second session, which illustrates the importance of not using the same subjects in recognition experiments.

Key words: recognition memory, long interval, word frequency effect.

Subject selection is one of the most important matters in conducting an experimental study. This study focuses on a problem of subject selection for a recognition experiment.

The recognition test is regarded as a popular task for measuring episodic memory. Also, episodic memory as measured by a recognition test is thought to be highly influenced by the passage of time (e.g., Tulving, 1983). In line with this idea, researchers may think a recognition experiment is immune from much earlier experiences and therefore the researchers may use the same subjects in different recognition experiments, if there is a long interval. However, we recently showed that much earlier experiences with stimuli affect our recognition judgment on the stimuli (Terasawa, 1994a; Terasawa & Ohta, 1993; Terasawa & Onose, 1993; Terasawa, Ayabe-Kanamura & Saito, 1995). Taking a general view of the results described in these studies, a single encounter with stimuli seems to decrease hits and increase false alarms towards the stimuli presented in a much later recognition test, so that recognition performance of the stimuli deteriorated in general (Terasawa, 1994a; Terasawa & Ohta, 1994). Moreover, the result of one study (Terasawa, 1994b) suggests that a recognition test session conducted 17-weeks previously increase false alarms to the words at another recognition test even when they had never been presented in the first session. Furthermore, this effect disappeared if the words were presented in a perceptually different style (handwritten) in the test list of the second recognition test. These findings imply that subjects who join a recognition test session will show lower performance in different much later recognition test. The main purpose of this study is to examine the

1) Requests for reprints should be sent to Takafumi Terasawa, Institute of Psychology, University of Tsukuba, Tsukuba-shi, Ibaraki-ken 305, Japan.

effect of a recognition test session on the performance of another much later recognition test using words that are perceptually similar but never presented in the first session.

Method

Subjects. Sixteen undergraduate students of University of Tsukuba participated in the experiment. All subjects joined two sessions with an 17-week interval.

Laboratory and Apparatus. An overhead projector (ELM HP-252) and a crystal display unit (UCHIDA LP40) was used to directly project a picture of a personal computer's (NEC PC-9801LV) output. The stimuli and some instructions were projected on the screen placed at a corner of the laboratory. The presentations of the stimuli were controlled by the computer. The room remained unchanged throughout the experiment and subjects had never entered the room before the experiment, so that the room was novel for the subjects.

Procedure. The second session was conducted at the same time of day and in the same laboratory as the first session. The procedure was the same in both sessions. While sitting in the laboratory, subjects received a booklet and read the instructions on the cover page. They were informed that they had to learn many words for a later recognition test without using any mnemonics. They were given a short demonstration. Then subjects were asked to learn a list of words. The items appear in the following way. A 85×40 cm rectangular frame appeared at the center of the screen and then items appeared in the middle of the frame one by one. Each item was presented at the rate of 2s per word with a .3s interval. The character size of each item was approximately 6.7×6.7 cm. Immediately after viewing all the words, they were requested to discriminate the targets in the test list at their own pace. In addition, at the end of the first session, the subjects were asked to write down information about their activity in the day prior to the experiment, their physical condition, and their impressions of the experiment. This information was given to the subjects at the beginning of the second session.

Design. In order to control the word-frequency effect (Glanzer & Adams, 1990), the factor of word-frequency was included in the design. The design was 2×2 within-subjects factorial. The two variables were session (session one, session two) and the word-frequency of the words (low and high).

Materials. All items were Japanese nouns written in two-letter kanji and randomly chosen from the frequency table of The National Language Research Institute (1973). Four sets of 96 words were randomly chosen on the condition that each set contained the same number of low-frequency words (4 per million) and high-frequency words (from 50 to 730 per million). The target lists for the first and second session were made by randomizing one of the four sets of items and adding six filler items. The test list for each session was constructed by randomizing the target list and another set of items. The test sheets were printed with a EPSON printer (HG-4000) and items were arranged in a similar fashion as the stimuli presented at the study phase of the first session (see Appendix). In total, the target lists of the first and the second session consisted of 108 items each and the test lists of the sessions consisted of 192 items each.

Results

Means of hits, false alarms and corrected recognition scores (see Table 1) were calculated for each session and word-frequency. A two-way within-subjects analysis of variance (*ANOVA*) on hits showed that the main effect of session was marginally significant, $F_{[1,15]} = 3.47$, $p < .10$, whereas the main effect of word-frequency and their interaction were not significant, $F_{[1,15]} = .34$, $F_{[1,15]} = .59$, respectively. A similar *ANOVA* on false alarms showed a significant effect of word-frequency ($F_{[1,15]} = 38.91$, $p < .01$). The main effect of session and interaction were not significant, $F_{[1,15]} = 3.04$, $F_{[1,15]} = 1.29$, respectively. A third two-way within-subjects *ANOVA* was performed on corrected recognition scores. The analyses yielded significant main effects of session and word-frequency, $F_{[1,15]} = 15.25$, $p < .05$, $F_{[1,15]} = 43.98$, $p < .01$, respectively. The interaction was not significant, $F_{[1,15]} = .04$.

Table 1 Means and SD of hits, false alarms and corrected recognition scores corresponding to session and word-frequency.

Recognition Performance	FIRST SESSION		SECOND SESSION	
	WORD-FREQUENCY		WORD-FREQUENCY	
	LOW	HIGH	LOW	HIGH
HIT	.71(.14)	.69(.12)	.65(.12)	.65(.12)
FALSE ALARM	.13(.10)	.24(.15)	.17(.13)	.31(.18)
CORRECTED RECOGNITION SCORE	.58(.12)	.45(.10)	.48(.15)	.34(.14)

Note. The data in parentheses indicates a standard deviation for each score. Corrected recognition scores = [hit rate] − [false alarm rate].

Discussion

The experiment examined the effect of a recognition test session on the performance of another much later recognition test using words that are perceptually similar but never presented in the first session.

If the first session influences recognition bias in the second session, then hits and false alarms would be contaminated. However, the analysis of corrected recognition scores for which the effect of bias is eliminated, apparently shows that the first session lowered performance in the second session 17 weeks later. This result definitely warns researchers not to use the same subject in different recognition experiments even though there may be a long interval between experiments.

The effect appearing in corrected recognition scores reflect an effect on hits or false alarms. Though we did not get a significant effect of the first session on hits and false alarms, the observed tendency accords with the results of Terasawa (1994a) and Terasawa & Ohta (1993). The studies suggest that a much earlier encounter with words lower hits and increase false alarms towards the words. The results reported here reproduce the similar pattern using different words in the two sessions. That is, much earlier encounters with words in a recognition test decreased hits and increased false alarms to the words on a later recognition test even when the words on the two tests were different but written in the similan font, which suggests an important role of perceptual information for the long−lasting effect reported in this paper.

References

Glanzer, M., & Adams, J. K. (1990). The mirror effect in recognition memory: Data and theory. *Journal of Experimental Psychology: Learning, Memory, and Cognition,* **16**, 5-16.

Terasawa, T. (1994a). *Inhibitory process in mechanism of item recognition: Long-lasting effects of a past experience and word-frequency effect.* Unpublished doctoral dissertation, University of Tsukuba, Japan. (in Japanese).

Terasawa, T. (1994b). Important role of perceptual information on long-lasting effects on item recognition. *Proceedings of the 58th Annual Meeting of the Japanese Psychological Association,* 815.

Terasawa, T., & Ohta, N. (1993). Long-term effect of one encounter with a target on item recognition. *The Japanese Journal of Psychology,* **64**, 343-350.

Terasawa, T. & Onose, M. (1993). The effect of recognition session on similar recognition session 8 months later. *Tsukuba Psychological Research,* **15**, 125-131.

Terasawa, T., Ayabe-Kanamura, S., & Saito, S. (1995). Implicit memory for odor after being exposed 16 months previously. *Proceedings of the Abstract in Chemical Senses.,* 190.

Tulving, E. (1983). *Elements of episodic memory.* Oxford University Press.

The National Language Research Institute (1973). *Studies on the vocabulary of modern newspapers Volume 4: General descriptions and Vocabulary Frequency Tables.* Tokyo: Syuuei Shyuppan. (in Japanese).

— Received Sept.30,1995 —

Appendix Appearance of the test sheets